SPRAGUE ROAD GROUND WATER PLUME
SUPERFUND SITE
PROPOSED PLAN OF ACTION

Ector County, Texas
July 2000

EPA PROPOSES REMEDY FOR GROUND WATER CONTAMINATION

In this Proposed Plan, the U.S. Environmental Protection Agency (EPA) describes the ground water and soil contamination at the Sprague Road Ground Water Plume Superfund site (Site) and the proposed cleanup strategy and technologies to address the contamination. The Site consists of three separate chromium contaminant plumes in the ground water and EPA is proposing to install a series of wells to pump the ground water to the surface for treatment to remove the chromium. The treatment plants will be located at one or more of the former chrome plating facilities. In addition, those private residences with contaminated drinking water wells will be provided the option to connect with the City of Odessa water supply. To remove any long-term source of contamination to the ground water at the facilities, EPA is also proposing to use the treated water to flush the high chromium concentrations in the soil down to the ground water for capture by the extraction wells.

This Proposed Plan is issued by the EPA, the lead agency for Site activities, and the Texas Natural Resource Conservation Commission (TNRCC), the support agency. EPA, in consultation with the TNRCC, will select a remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with the TNRCC, may modify the proposed alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan. The Remedial Investigation/Feasibility Study (RI/FS) report for this Site should be consulted for more detailed information on these alternatives.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under section 117(a) of the Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the RI/FS report and other documents contained in the Administrative Record file for this Site. The EPA and TNRCC encourage the public to review these documents to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site.

The Administrative Record file, which contains the information on which the selection of the response action will be based, is available at the following locations:

Ector County Public Library
Southwest History Dept. 2nd Floor
321 West 5th Street
Odessa, Texas 79760
(915) 337-2501

U.S. Environmental Protection Agency Region 6
7th Floor Reception Area
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 665-6617

Texas Natural Resource Conservation Commission
Building D, Record Management, Room 190
12100 Park 35 Circle
Austin, Texas 78753
(512) 239-2920

COMMUNITY PARTICIPATION

The public is invited to comment on the RI/FS report and Proposed Plan for the Site. The public comment period begins on July 27, 2000, and ends on August 25, 2000. During the public comment period, written comments may be submitted to:

Vincent Malott
Remedial Project Manager
U.S. EPA (6SF-AP)
1445 Ross Avenue
Dallas, Texas 75202-2733
malott.vincent@epa.gov

Additionally, oral comments will be accepted at a public meeting scheduled for:

Thursday, August 3, 2000, at 7:00 pm,
University Park Baptist Church - Fellowship Hall
8650 North Golder
Odessa, Texas

EPA will respond to all comments on this Proposed Plan received during the public comment period in a document called a Responsiveness Summary. The Responsiveness Summary will be attached to the Record of Decision (ROD) for this Site and made available to the public in the information repositories. The ROD explains the remedial action selected for implementation at this Site. The remedy may be different from the preferred alternative identified in this Proposed Plan based on comments, new information, or issues received during the public comment period. Any aspects of the proposed action that are significantly different from the Proposed Plan will be explained in the ROD. The ROD will be signed by the Regional Administrator for EPA Region 6.

Information about the public involvement process and answers to questions about activities at the Site can obtained from the following:

Vincent Malott, Remedial Project Manager
U.S. EPA (6SF-AP)
1445 Ross Avenue

Dallas, Texas 75202-2733
(214) 665-8313
malott.vincent@epa.gov

Diane Poteet, Project Manager
Texas Natural Resource Conservation Commission
P.O. Box 13087
Austin, Texas 78711-3087
(512) 239-2502
dpoteet@tnrcc.state.tx.us

Media inquiries should be directed to Mr. Dave Bary, EPA Region 6 Press Officer, at (214) 665-2208.

SITE BACKGROUND

The Site is located in Ector County outside the northwest city limits of Odessa, Texas, and consists of three abandoned metal plating facilities located within 1 mile of each other (Figure 1): Leigh Metal Plating (LMP), National Chromium Corporation (NCC), and Machine and Casting, Inc. (M&C).

Leigh Metal Plating, Inc.

The LMP facility is an abandoned chrome plating and metal machining shop located at 2725 West 81st street. The LMP facility is approximately 2.7 acres in size and consists of a main office/machine shop building and a second building containing a chrome plating shop. The facility operated from 1976 to 1992 and operated an electroplating system that used chromium solutions. In 1984, an unknown volume of chromic acid rinse water was released inside the chrome plating shop and approximately 211 cubic yards of soil were excavated and disposed of at an off-site landfill. In response to a citizen complaint in 1991, the Texas Water Commission (TWC) sampled the ground water from nearby wells and identified chromium contamination in six wells east of the LMP facility. TWC connected those residents with impacted wells to the City of Odessa water supply and installed ground water monitoring wells to evaluate the chromium contamination. EPA conducted an emergency removal of chromium contaminated waste in 1996, and a total of 4,070 gallons of liquid waste, and 2,550 gallons of solid waste were removed for off-site disposal. Ground water samples collected during the 1996 emergency removal assessment detected a chromium contaminant plume extending east of the LMP facility. Land use immediately east of the facility is a mix of residential and commercial/industrial properties that utilize private wells for non-drinking water purposes. Residences immediately east of the contaminant plume depend on private wells for their drinking water supply. EPA supplied bottled water to three residences affected by the contaminant plume.

National Chromium Corporation

The NCC facility is an inactive/abandoned cast iron welding and cylinder repair shop located at 2626 Stevens Road, approximately 850 feet south of the LMP facility. The NCC facility is approximately 2.5 acres in size and consists of a main office/machine shop building containing a chrome plating shop. The facility operated from 1979 to 1993 and chrome plating wastes were stored in a surface impoundment. A TWC enforcement action in 1987 required NCC to close the impoundment and remove the wastes and soil. While NCC had initiated closure activities by 1989, all of the requirements had not been met prior to the facility closing in 1993. EPA conducted an emergency removal of chromium contaminated waste in

1996 and a total of 115,700 pounds of vat and tank sludge, 40,620 pounds of tank liquid waste, and 5,187,340 pounds of soil waste were removed for off-site disposal. Ground water samples collected during the 1996 emergency removal assessment detected a chromium contaminant plume extending east and southeast of the NCC facility. Land use south of the facility and Stevens Road is residential property supplied by private drinking water wells while businesses east of the facility and north of Stevens Road are supplied by water supply lines from the City of Odessa. EPA supplied bottled water to one residence affected by the contaminant plume.

Machine and Casting, Inc.

The M&C facility is an abandoned cast iron welding and cylinder repair shop located at 8410 Sprague Road, approximately 1500 feet north of the LMP facility. The M&C facility is approximately 2 acres in size and consists of an office/machine shop building with an attached chrome plating room. The facility operated from 1978 to 1988 with a small electroplating system that used chromium solutions. In 1988, under the direction of the TWC, 48 drums of chromium-contaminated soil, 18 over-packed drums of chromium-contaminated debris, the plating vat, and 220 gallons of spent chrome plating solution were removed from the site. TWC sampled the ground water from nearby wells between 1989 and 1992 and identified chromium contamination in a private well 150 feet north of the M&C building at concentrations ranging from 0.825 to 3.84 mg/L. Ground water samples collected during a 1996 emergency removal assessment by EPA detected a chromium contaminant plume extending east of the M&C facility. Land use east of the facility is primarily residential property dependent on private wells for their drinking water supply. Private wells located at commercial/industrial businesses north and south of the M&C property are used for non-drinking water purposes.

National Priorities List

On April 1, 1997, EPA proposed the Site to the National Priorities List (NPL) of Superfund sites. The Site was placed on the NPL on October 27, 1997 (62 Fed. Reg. 186, September 25, 1997).

SUMMARY OF SITE CHARACTERISTICS

EPA conducted the RI/FS upon which the Proposed Plan is based. As part of the RI, additional monitoring wells were installed to determine the extent of the chromium contaminant plume. Ground water samples were collected from both monitoring wells and private water supply wells during three rounds of sampling in 1998 and 1999. In addition, aquifer tests were performed to determine aquifer characteristics that may affect the remedial options for the contaminated ground water. Soil samples were collected at each of the three facilities at a depth of 0 - 2 feet to determine the presence of contamination that may affect future industrial workers at a redeveloped facility on the property. The unsaturated soils (vadose zone) above the water table were also sampled to determine if there are contaminants that may continue to migrate downward to the ground water. The vadose zone consists of a caliche horizon that extends from near the ground surface to a depth of 20 - 30 feet and is underlain by fine grained sandstone.

Ground water occurs at an approximate depth of 85 feet in the Trinity sandstone. The base of the aquifer is a red clay between 140 - 150 feet below ground surface. Ground water flow is generally west to east across the M&C and LMP facilities switching to a southeast direction near the NCC facility. The chromium detected at the Site consists of a trivalent form which is less toxic and generally immobile in the subsurface; and a hexavalent form that is more toxic and quite mobile in the subsurface soil and ground water.

Leigh Metal Plating, Inc.

The surface soil is a silty fine sand with a thickness of 1 to 5 feet above the underlying caliche. A total of 46 soil samples were collected from 30 locations at a depth of 0 - 2 feet. Chromium was detected at the highest concentrations along the western property boundary at 3,290 mg/kg, and near the main office/shop building at 555 - 1,930 mg/kg. Hexavalent chromium was detected at only one location at a maximum concentration of 346 mg/kg, with a corresponding total chromium concentration of 1,930 mg/kg.

The subsurface soil in the vadose zone was sampled to a depth of 60 feet at 3 locations in proximity to the former plating room. A total of 22 samples were collected and chromium was detected at concentrations ranging from 1.6 - 27.5 mg/kg. Hexavalent chromium was detected in one sample at 0.76 mg/kg.

Ground water samples were collected from 38 wells (both private and monitoring) surrounding the LMP facility (Figure 2). The maximum detected chromium concentration was 3.78 mg/L in monitoring well LMW-14 located at the general mid-point of the contaminant plume. The estimated size of the chromium plume is 60 acres with an approximate length of 1,750 feet and width of 650 feet. Sample analysis did not detect either volatile or semi-volatile organic contaminants above their respective screening levels.

National Chromium Corporation

The surface soil is a silty fine sand with a thickness of 3 to 5 feet above the underlying caliche. A total of 50 soil samples were collected from 25 locations at a depth of 0 - 2 feet. Chromium was detected at the highest concentrations adjacent to the northern and western sides of the NCC building and within the footprint of the former impoundment. The five highest chromium concentrations across the property were between 151 - 8,040 mg/kg. Hexavalent chromium was also detected in concentrations as high as 86.9 adjacent to the building and 261 mg/kg at the former impoundment.

The subsurface soil in the vadose zone was sampled to a depth of 65 feet at five locations in proximity to the former impoundment on the north side of the main building. A total of 65 samples were collected and chromium was detected at concentrations ranging from 1.6 - 1,170 mg/kg. Hexavalent chromium was detected at concentrations ranging from 0.26 - 38.7 mg/kg. The presence of hexavalent chromium concentrations above 1.0 mg/kg may represent a potential source of ground water contamination based on predictive modeling of the vadose zone. Water leaching downward from rainfall and any future septic system may contribute additional chromium contamination to the ground water. Because of the inconsistent distribution of hexavalent chromium in the vadose zone soils, this site waste is not readily classifiable as either a principal or low level threat waste.

Ground water samples were collected from 20 wells (both private and monitoring) surrounding the NCC facility. The maximum detected chromium concentration was 11.2 mg/L in monitoring well NMW-3 located on the facility property. The estimated size of the chromium plume is 15 acres with an approximate length of 950 feet and width 500 feet. Sample analysis detected 1,1-dichloroethylene, a volatile organic contaminant, at 7 ug/L and 9 ug/L in two on-site monitoring wells during separate sampling events.

Machine and Casting, Inc.

The surface soil is a silty fine sand that is typically less than 2 feet in thickness and in some places absent above the underlying caliche. A total of 30 soil samples were collected from 15 locations at a depth of 0 - 2 feet . The highest chromium concentrations were detected along the southern property boundary at 97.3 mg/kg, and in a drainage area near the plating room at 340 mg/kg. Hexavalent chromium was not detected in the upper 2 feet of soil.

The vadose zone was sampled to a depth of 61 feet at four locations in proximity to the former plating room on the north side of the main building. A total of 48 samples were collected and chromium was detected at concentrations ranging from 1.7 - 4.1 mg/kg. Hexavalent chromium was detected at concentrations ranging from 0.16 - 1.5 mg/kg. The small plating room is the apparent source of the chromium detected in the ground water. The presence of hexavalent chromium concentrations above 1.0 mg/kg may represent a potential source of ground water contamination based on predictive modeling of the vadose zone. Water leaching downward from rainfall and any future septic system may contribute additional chromium contamination to the ground water. Because of the low concentration and inconsistent distribution of hexavalent chromium in the vadose zone soils, this site waste is not readily classifiable as either a principal or low level threat waste.

Ground water samples were collected from 22 wells (both private and monitoring) surrounding the M&C facility (Figure 4). The maximum detected chromium concentration was 0.270 mg/L in a private well M-1 adjacent to the M&C facility. The estimated size of the chromium plume is 6 acres with an approximate length of 1,100 feet and width of 150 feet. Sample analysis did not detect either volatile or semi-volatile organic contaminants above their respective screening levels.

SCOPE AND ROLE OF RESPONSE ACTION

This response action is the final Site remedy and is intended to address fully the threats to human health and the environment posed by the conditions at this Site. The previous removal actions at the M&C, LMP, and NCC facilities addressed the source materials, which included spent chromium plating solution and chromium contaminated sludge, soil and debris. These source materials constituted the principal threat wastes at each of the facilities. The purpose of this response action is to cleanup the ground water contamination originating from each of the three facilities, reduce contaminant concentrations in the soil which may contribute to long-term contamination of the ground water, and reduce risks to those residences exposed to contaminated ground water above acceptable risk levels.

SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a streamlined risk assessment to determine the current and future effects of contaminants on human health and the environment from exposure to site-related contaminants in the soil and ground water.

Human Health Risks

Ground Water - Since ground water currently supplies drinking water to nearby residents, the contaminant concentrations in ground water were compared with Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act. Contaminant concentrations exceeding their respective MCLs were identified as a contaminant of potential concern (COPC). Chromium is the principal COPC with maximum concentrations of 0.270 mg/L, 4.2 mg/L, and 0.762 mg/L in off-site wells from the M&C, LMP, and NCC facilities, respectively, exceeding the MCL of 0.100 mg/L.

Soil - The past land use at the three facilities has been for commercial/industrial purposes and is a reasonably anticipated future land use at each facility. The baseline risk assessment focused on the likelihood of health effects for industrial workers that could result from current and future direct contact with contaminated soil. EPA considers two types of risk: cancer risk and non-cancer risk. EPA's statistical analysis of soil sampling data indicates that the probable exposure to chromium in the soil at the LMP and NCC facilities would result in an excess lifetime cancer risk of 1×10^{-6} and 4×10^{-7}, respectively, for commercial/industrial workers. These cancer risks are below the acceptable risk range of 10^{-4} to 10^{-6}. The cumulative non-cancer adverse health effects for exposure to chromium in soil at the LMP and NCC facilities would result in a hazard index of 0.2 and 0.005, respectively, for the same workers. These values do not exceed the "threshold level" (measured usually as a hazard index of less than 1) below which non-cancer health effects are no longer predicted. The contaminants of potential concern at the M&C facility did not exceed the EPA Region 6 screening toxicity values and thus no further calculations were made regarding potential cancer risks or adverse health effects to Site workers. The EPA Region 6 screening values for industrial workers is based on an exposure to a contaminant at a concentration representing a cancer risk of 1×10^{-6} or a hazard index less than 1.

Ecological Risks

A screening ecological risk assessment indicated that the potential for significant ecological impacts to occur was small. Due to the depth below ground surface for the water table, the ground water does not discharge to any nearby surface water body. Based upon the relatively small size of the facilities, low contaminant concentrations in the surface soils, the lack of any current natural habitat within the commercial/industrial areas, and the absence of nearby surface water bodies, there was little potential for significant exposure of wildlife to the contaminants.

Summary

It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for the Site are to:

- Prevent exposure to contaminated ground water, above acceptable risk levels;
- Prevent or minimize further migration of the ground water contaminant plume;
- Prevent or minimize further migration of contaminants from source materials to ground water; and
- Return ground waters to their expected beneficial uses wherever practicable.

The Preliminary Remediation Goals for the following chemicals of potential concern in ground water are based on the Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act: chromium - 0.100 mg/L; and 1,1-dichloroethene - 0.007 mg/L.

SUMMARY OF REMEDIAL ALTERNATIVES FOR GROUND WATER (GW)

The alternatives developed to address the ground water contamination are based in part on the lessons learned from the Odessa I and II Superfund Sites located in Odessa, Texas. The two Odessa Superfund Sites are also contaminated with chromium from similar facility operations. However, the characteristics of the aquifer and ground water usage between the Sprague Road Site and the Odessa Sites requires separate evaluation and determination of the appropriate response action. The use of natural physical and chemical processes (i.e., natural attenuation) to restore ground water to drinking water use was not considered at this Site because of the continued migration of the contaminant plume and the close proximity of additional private drinking water wells down gradient of the plume boundary. The use of other ground water cleanup technologies is also limited due to the depth of the water table and continued reliance of the ground water as a private drinking water supply in the area.

GW Alternative 1: No Further Action

Estimated Capital Cost: $0
Estimated Annual O&M Costs: $0
Estimated Present Worth: $0

Regulations governing the Superfund program require that the "no action" alternative be evaluated at every Site to establish a baseline for comparison. Under this alternative, EPA would take no action at the Site to prevent exposure to the ground water contamination.

GW Alternative 2: Ground Water Extraction and Treatment

Estimated Capital Cost: $7,451,000
- *Testing/Mobilization: $550,000*
- *Extraction/Injection Well System: $1,922,000*
- *Treatment System: $1,787,000*
- *City Water Connections: $510,000*
- *Indirect Costs: $1,645,000*
- *Contingency (20%): $968,000*

Estimated Annual O&M Costs: $1,098,000 - 1,226,000
Estimated Present Worth (7%): $21,423,600

Ground water extraction wells would be placed at locations selected to capture each of the three separate ground water plumes. The proposed number and location of extraction wells is based on ground water modeling of the Site and includes 4 wells at the M&C facility, 8 wells at the LMP facility, and 10 wells at the NCC facility. The final number and location of extraction wells would be determined during the remedial design. The ground water would be restored to drinking water quality through extraction and treatment to meet the final cleanup levels throughout the entire plume. Based on predictive ground water modeling, the expected cleanup time frame may extend from 20 to 30 years. However, the cleanup time frames for the Odessa I and II Sites has generally been less than 10 years.

Once extracted, the ground water would be conveyed through underground piping to a treatment plant(s) located at one or more of the three facilities. The treatment component of this ground water alternative would utilize presumptive technologies identified in EPA's ground water presumptive strategy, "Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites," October 1996, OSWER Directive Number 9283.1-12. Since the primary contaminants of concern are chromium and potentially other metals, one or more of the presumptive technologies - chemical precipitation, ion exchange/adsorption, or electrochemical methods - would be used for treating the contaminants in the extracted ground water. Chemical precipitation chemically converts dissolved metals in water such as chromium into an insoluble precipitate or sludge. Ion exchange replaces dissolved metals in water with non-toxic ions as the water passes over an impregnated resin. Electrochemical processes use electrical current applied between two electrodes to attract the dissolved metals in water forming a precipitate or sludge. The actual technologies and sequence of technologies used for the treatment system would be determined during remedial design. The precipitate or sludge wastes generated during the treatment process would be transported to an off-site location for disposal in accordance with the Resource Conservation and Recovery Act (RCRA) requirements. Removal of the plating rooms at one or more of the three facilities may be required to provide a site for the treatment plant construction and provide access for the ground water disposal system.

The disposal options for the treated water include the use of injection wells to enhance the flushing within the contaminant plume or infiltration galleries located at one or more of the three facilities. Infiltration galleries allow the water to seep downward through the soil to the underlying aquifer. The treated water would be conveyed through underground piping to the injection wells or infiltration galleries. The current cost estimate is based on the use of 8 injection wells located at the M&C facility (2 wells), LMP facility (3 wells), and NCC facility (3 wells). The use of one or more of these options and the number and location of injection wells/infiltration galleries would be determined during the remedial design.

To prevent exposure to contaminated ground water, above acceptable risk levels during the remedial design and remedial action activities under this alternative, city water connections would be offered to those residents with private drinking water wells impacted by the ground water contamination. The costs for installing the city water connections are included in the cost estimate for this alternative. The monthly charge for water consumption would be paid for by the resident.

A contingency included in this component is the use of certain chemicals, such as ferrous sulfate, to reduce the mobile hexavalent chromium to the immobile trivalent chromium. The use of such chemicals would be limited to areas of high chromium concentrations near the original source areas within the existing facility boundaries. The ground water extraction system would be used to prevent off-site migration and the use of the ground water monitored until conditions return to drinking water quality.

SUMMARY OF REMEDIAL ALTERNATIVES FOR THE VADOSE ZONE (VZ)

The presence of hexavalent chromium concentrations above 1.0 mg/kg may represent a potential source of ground water contamination based on predictive modeling of the vadose zone. Water leaching downward from rainfall and any future septic system may contribute additional chromium contamination to the ground water. A common component of the proposed alternatives is the removal of part or all of the former plating rooms at the M&C and NCC facilities to provide access for the vadose zone remedial alternatives.

VZ Alternative 1: No Further Action
Estimated Capital Cost: $0
Estimated Annual O&M Costs: $0
Estimated Present Worth: $0

Regulations governing the Superfund program require that the "no action" alternative be evaluated at every Site to establish a baseline for comparison. Under this alternative, EPA would take no action at the Site to prevent exposure to the ground water contamination.

VZ Alternative 2: Cap
Estimated Capital Cost: $202,000
Mobilization/Demobilization: $10,000
Site Preparation: $13,466
Cap Construction: $77,895
Institutional Controls: $30,000
Indirect Capital Costs: $44,662
Contingency (20%): $26,272
Estimated Annual O&M Costs: $12,500 - 33,400
Estimated Present Worth: $402,200

The cap alternative would include placement of a 3-foot thick multilayered cap over those areas where the hexavalent chromium concentrations in the vadose zone are above a concentration of 1.0 mg/kg at the M&C and NCC facilities. The cap construction would consist of a 1 foot thick soil layer over a compacted clay layer. The purpose of the cap is to reduce rain water infiltration that has the potential to further leach hexavalent chromium from the vadose zone to the underlying ground water. The cap size is estimated to be 850 square yards at the M&C facility and 2,639 square yards at the NCC facility. Installation of a cap at the two facilities would also require annual site monitoring and maintenance to ensure the integrity of the cap construction. Institutional controls on the future use of the property would also be required to eliminate the possible installation of a septic leach field or other construction activity on the cap area that would reduce the effectiveness of the cap.

VZ Alternative 3: Vadose Zone Flushing
Estimated Capital Cost: $884,000
Site Work: $406,200
Infiltration Galleries: $167,693
Indirect Capital Costs: $195,192
Contingency (20%): $114,819
Estimated Annual O&M Costs: $34,800 - 55,700
Estimated Present Worth (7%): $1,360,900

Vadose zone flushing utilizes an infiltration gallery to flush water downward through the soils to leach the hexavalent chromium from the soils. This alternative would be coupled with a ground water extraction system to capture and remove the chromium. Infiltration galleries consist of slotted pipes installed below the ground surface similar to a septic system drain field. This alternative would make use of the steady supply of treated water from a ground water extraction system to accelerate the flushing of the hexavalent chromium.

VZ Alternative 4: Vadose Zone Flushing with Excavation of Hot Spots and Off-Site Disposal
Estimated Capital Cost: $1,190,000
Site Work: $592,400
Infiltration Galleries: $180,108
Indirect Capital Costs: $262,652
Contingency (20%): $154,502
Estimated Annual O&M Costs: $34,800 - 55,700
Estimated Present Worth (7%): $1,666,900

This alternative is the same as Alternative 3 except that soils to a depth of 10 feet below the ground surface would be excavated to remove local hot spots containing high chromium concentrations prior to the installation of an infiltration gallery. For the purposes of developing the cost estimate, 10 percent of the soils were assumed to be contaminated and would be disposed of off-site at a RCRA hazardous waste Subtitle C facility.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The "Detailed Analysis of Alternatives" can be found in the FS report.

1. **Overall Protection of Human Health and the Environment** *determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.*

Ground water alternative 2 is protective of human health by restoring the contaminated aquifer to its beneficial use by extracting and treating the ground water and providing an alternate water supply to those residences affected by the current contaminant plume. Vadose zone alternatives 3 and 4 would provide protection by flushing the chromium contamination into the active ground water extraction system. Vadose zone alternative 2 would rely on engineering and institutional controls. The ground water and vadose zone "No Action" alternatives would not eliminate, reduce, or control the existing threats to public health or the environment.

2. **Compliance with Applicable, Relevant, and Appropriate Requirements (ARARs)** *evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the Site or whether a waiver is justified.*

All ground water and soil alternatives would meet their respective ARARs from Federal and State laws.

3. **Long-term Effectiveness and Permanence** *considers the ability of an alternative to maintain protection of human health and the environment over time*.

The ground water alternative 2 would remove the threat of direct exposure by providing city water connections to those residents affected by the ground water contamination and the long-term goal of restoring the ground water to drinking water standards. The relative success of the ground water extraction system in removing chromium contaminated ground water from the aquifer has been demonstrated at the

Odessa I and II Superfund Sites. Similar long-term success is expected at the Sprague Road Ground Water Plume Site. Areas of high chromium concentration beneath the NCC facility may be more difficult in achieving the drinking water standard.

The vadose zone alternatives 3 and 4 provide higher levels of long-term protection compared to alternative 2 because of the permanence and reliability of the institutional controls restricting future land use over the cap cannot be guaranteed.

4. **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** *evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.*

Ground water alternative 2 utilizes treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present and thus supports that statutory mandate.

Vadose zone alternatives 3 and 4 would reduce the volume of the contaminants in the vadose zone by flushing the contaminants to the ground water. If alternative 3 or 4 is implemented concurrently with the ground water extraction system, then the flushed contaminants would be extracted and treated at the treatment plant, thus reducing the contaminants' toxicity and mobility. Alternative 2 would only reduce mobility of the contaminants beneath the cap by controlling infiltration to the vadose zone.

5. **Short-term Effectiveness** *considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.*

The length of time needed for construction and operation of ground water alternative 2 is 6 - 12 months. The length of time needed for construction of the vadose alternatives and 3 is estimated at less than 6 months. Vadose zone alternative 4 would pose some degree of risk to workers and the community caused by the excavation and transport of the soil to an off-site disposal facility. The remaining alternatives do not pose a substantial risk during construction or operation.

6. **Implementability** *considers the technical and administrative feasibility of implementing the alternative such as relative availability of goods and services.*

All of the alternatives are equally implementable without construction difficulties. The presumptive treatment technologies for contaminated ground water are proven treatment methods that can be installed at the site with minimal impacts. The installation of injection and extraction wells can be performed with locally available labor and materials. Some administrative issues requiring resolution involve the installation of any pipeline across roads and access to adjacent property surrounding the three facilities. The long-term use of institutional controls may restrict future development of any facility property.

7. **Cost** *includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.*

The present worth cost for ground water alternative 2 is $21,423,600. The present worth costs for vadose zone alternatives 3and 4 are more than double the cost for vadose zone alternative 2 at $1,360,900 and $1,666,900 versus $402,200, respectively. Integration of the vadose zone alternative 3 or 4 with the preferred ground water alternative may offer some cost savings by providing a disposal method for the treated ground water.

8. **State/Support Agency Acceptance** *considers whether the State agrees with U.S. EPA's analyses and recommendations of the RI/FS and the Proposed Plan.*

TNRCC has been provided the opportunity to review the RI/FS report and Proposed Plan. Their support for the preferred alternative will be evaluated during the public comment period.

9. **Community Acceptance** *considers whether the local community agrees with U.S. EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.*

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The preferred remedial alternatives for the Sprague Road Ground Water Plume Site is ground water alternative 2, Ground Water Extraction and Treatment, and vadose zone alternative 3, Vadose Zone Flushing. The preferred ground water alternative will achieve the remedial action objectives of: 1) prevent exposure to contaminated ground water, above acceptable risk levels; 2) prevent or minimize further migration of the ground water contaminant plume; and 3) return ground waters to their expected beneficial uses wherever practicable. The preferred vadose zone alternative 3 will achieve the remedial action objective of preventing or minimizing further migration of contaminants from source materials to ground water by flushing the chromium into the ground water extraction system. Alternative 3 was preferred over the other alternatives based on the removal of contaminants at a lower cost and without requiring the transportation of large volumes of soil to an off-site disposal facility. In addition, the alternative 3 can be utilized as a disposal method for the treated ground water. The preferred alternatives identified in this Proposed Plan can change in response to public comment or new information.

Based on information currently available, the EPA believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA § 121(b): 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.